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GNRO-2017/00022

August 16, 2017

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Licensee Event Report (LER) 2016-004-01, Automatic Reactor SCRAM
During Turbine Stop and Control Valve Surveillance Due to Reactor
Pressure and Power Oscillations
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is Supplemental LER 2016-004-01, Automatic Reactor SCRAM During Turbine Stop and Control Valve Surveillance Due to Reactor Pressure and Power Oscillations.

This letter contains no new commitments. If you have any questions or require additional information, please contact Douglas Neve at (601) 437-2103.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Neve", with a long horizontal flourish extending to the right.

Douglas Neve
Manager Regulatory Assurance
Grand Gulf Nuclear Station
DAN/ram

Attachment: Licensee Event Report (LER) 2016-004-01

cc: (See Next Page)

cc: U.S. Nuclear Regulatory Commission
ATTN: Mr. Siva Lingam, NRR/DORL (w/2)
Mail Stop OWFN 8 B1
11555 Rockville Pike
Rockville, MD 20852-2738

U.S. Nuclear Regulatory Commission
ATTN: Kriss M. Kennedy (w/2)
Regional Administrator, Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

1. FACILITY NAME

Grand Gulf Nuclear Station, Unit 1

2. DOCKET NUMBER

05000 416

3. PAGE

1 OF 3

4. TITLE

Automatic Reactor scram During Turbine Stop and Control Valve Surveillance Due to Reactor Pressure and Power Oscillations

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	17	2016		2016-004-01		8	16	2017	N/A	05000 N/A
									N/A	05000 N/A

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

9. OPERATING MODE 1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
10. POWER LEVEL 65	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Douglas Neve / Manager, Regulatory Assurance

TELEPHONE NUMBER (Include Area Code)

(601) 437-2103

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	JJ	FSV	Utility Power Corp	Y	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH

DAY

YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On June 17, 2016, at 0256 Central Daylight Time, Grand Gulf Nuclear Station experienced an automatic reactor scram. Prior to the scram, Grand Gulf Nuclear Station was operating in Mode 1 at approximately 65% rated thermal power and performing the Turbine Stop and Control Valve Operability Surveillance. During the surveillance, after the 'B' Turbine Stop valve was closed per procedure, the 'D' Turbine Stop Valve unexpectedly closed. The 'A' and 'C' Turbine Control Valves were then challenged to control Turbine and Reactor pressure resulting in Reactor pressure and power oscillations. The causes of this event were inadequate procedural guidance and the failure to use conservative decision making strategy. Corrective actions included replacement of the defective solenoid valves, and the revision of the applicable testing and Operations performance standards procedures.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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1. FACILITY NAME	2. DOCKET	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV. NO.
Grand Gulf Nuclear Station, Unit 1	05000 416			
			2016-004-01	

NARRATIVE

PLANT CONDITIONS PRIOR TO THE EVENT

At the time of the event, Grand Gulf Nuclear Station (GGNS) Unit 1 was in MODE 1 at approximately 65% rated thermal power due to a planned power reduction to complete a Control Rod sequence exchange, Steam Jet Air Ejector (SJAЕ) swap, Cooling Tower acid flush, and Main Turbine Stop and Control Valve Operability Surveillance. All systems, structures and components that were necessary to mitigate the consequences of, or limit the safety implications of an event were available. No safety significant components were out of service.

DESCRIPTION

On June 17, 2016, GGNS was in Mode 1 at approximately 65% rated thermal power performing the main turbine stop (MTSV) [SHV] and control valve (MTCV) [XCV] operability surveillance. During the surveillance, the 'B' Turbine Stop Valve was closed, as directed by the surveillance procedure. While the 'B' Turbine Stop Valve was closed, the 'D' Turbine Stop Valve unexpectedly closed, resulting in a Division II Reactor Protection System (RPS) half scram signal.

With the 'B' and 'D' Turbine Stop Valves closed, the remaining 'A' and 'C' Turbine Control Valves were challenged to precisely control Turbine and Reactor pressure. This resulted in Reactor pressure and power oscillations. Although oscillations were occurring, Reactor pressure and water level maintained margin to scram setpoints.

Multiple attempts were made to reset the 'B' Turbine Stop Valve followed by power reduction. While driving rods to reduce power, the Reactor received an automatic scram at 0257 on a Neutron Monitoring System Oscillation Power Range Monitor (OPRM) trip.

REPORTABILITY

This Licensee Event Report (LER) is being submitted pursuant to Title 10 Code of Federal Regulations (10 CFR) 50.73(a)(2)(iv)(A) for an automatic actuation of the RPS. Telephonic notification was made to the U.S. Nuclear Regulatory Commission (NRC) Emergency Notification System on June 17, 2016, within 4 hours of the event pursuant to 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72 (b)(3)(iv)(A) for a valid RPS actuation while the reactor was critical.

CAUSE

Two separate root cause evaluations were used to analyze this event; one evaluated the equipment and components that initiated reactor pressure and power oscillations during turbine stop and control valve testing, and the other, evaluated the operations shift crew performance following the onset of the reactor pressure control instability period.

Equipment Direct Cause: The direct cause of this event was reset solenoid valve [FSV] stuck in a position that opened a drain path allowing depressurizing of the trip fluid supply header.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET(See NUREG-1022, R.3 for instruction and guidance for completing this form
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Equipment Root Cause 1: The first root cause (RC) of this event related to equipment was the turbine stop and control valve operability procedure instructions were developed allowing the use of a force amplifying tool to manually operate an automatic turbine test (ATT) solenoid valve [FSV]. The adverse effect of tool usage on the solenoid valve and alternate manual testing methods, were not considered.

Equipment Root Cause 2: The second RC of this event related to equipment was the reset solenoid valve misoperated when a force multiplying tool was used by the operators to actuate it. This opened an unintended drain path from the trip fluid supply to the depressurized start-up fluid header causing a rapid loss of trip fluid header pressure resulting in MTSV "D" closure and initiation of turbine and reactor pressure oscillations.

Operations Direct Cause 1: The direct cause of this event related to operator performance was that the operations shift crew did not manually scram the reactor when reactor power, pressure and level were oscillating abnormally resulting in an automatic scram.

Operations Root Cause 1: The first RC of this event related to operations is station management did not effectively implement and reinforce a comprehensive Conservative Decision-Making (CDM) strategy for the plant operators. This resulted in the operations crew making multiple attempts to re-open the "B" turbine stop valve, allowing the uncontrolled reactor power, pressure, and level oscillations to continue over a 44-minute period. The operations crew approach ultimately resulted in an automatic scram.

Operations Root Cause 2: The second RC of this event related to operations was that operators did not have specific procedural guidance to address operating limits during transients caused by malfunctions of the turbine controls system (TCS). This resulted in the failure to perform a manual reactor scram because the operators were not provided operating limits for the reactor power fluctuations initiated by the TCS malfunction.

CORRECTIVE ACTIONS

The immediate corrective action was to replace both ATT solenoid valves.

The key corrective action to prevent recurrence addressing both Equipment RC-1 and RC-2 is to revise the turbine stop and control valve operability procedure to change the testing method. The new method will:

- Exclude the requirement to hold the ATT solenoid plunger for extended periods.
- Use ATT test valve hand wheel in lieu of reset solenoid valves to reset/open main stop valve.
- Remove the cautions stating "use of a suitable size pipe or dowel to depress the plungers is desired."

Furthermore, procedures will be reviewed to identify any non-standard tool used to operate systems that can affect reactor pressure, level, and power and to evaluate continued use of the tool or revise the procedure to eliminate use of the tool from the procedure.

NRC FORM
(6-2016)

366A U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 3/31/2020



LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

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NARRATIVE

The key corrective action to prevent recurrence addressing Operations RC-1 is to revise operations administrative procedures to include the operations CDM strategy and to require that evaluated simulator scenarios include a qualitative attribute to evaluate crew performance for operator fundamental use, including the attribute for CDM.

The key corrective action to prevent recurrence addressing Operations RC-2 is to develop and implement an off-normal event procedure for reactor pressure control malfunctions.

SAFETY SIGNIFICANCE

The event posed no threat to the health and safety of the general public or to nuclear safety as RPS performed as designed. No Technical Specification safety limits were violated. Industrial safety was not challenged, and there was no potential or actual radiological release during the event.

PREVIOUS SIMILAR EVENTS

There were no previous GGNS equipment failure events that were similar to this event. The use of internal and external operating experience was not causal for the Operations performance lapses identified as the root causes for this event.